May 2015 subject reports

Design Technology

Overall grade boundaries

Higher level

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 13	14 – 25	26 – 36	37 – 48	49 – 61	62 – 74	75 - 100

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 13	14 – 26	27 – 40	41 – 51	52 – 61	62 – 73	74 - 100

Standard and higher level internal assessment

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 8	9 – 17	28 – 25	26 – 32	33 – 39	40 – 46	47 - 60

The range and suitability of the work submitted

The sample work moderated demonstrated some exemplary teaching strategies, original project ideas, excellent use of modelling and CAD CAM to enhance development, good workshop practice and a wide range of appropriate presentation techniques. Unfortunately a few schools still require further guidance and training so as to meet the standards required.

Schools continue to vary in their approach to meet requirements of the assessment of this component. A few schools continue to assess two “design and make” projects; one of which is the major design task. The second method is to complete the “design and make” project, and supplement this with a range of tasks and mini-projects that address different aspects of the assessment criteria. Both strategies are appropriate, but the latter provides greater opportunities for students to address each assessment criterion more than once, and so improve their marks. However, care must be taken to enable candidates to address each task with sufficient time to address the assessment criteria fully. In some instances schools had been over ambitious in setting a large number of tasks, can be to the detriment of the quality of work submitted.

Time allocated to internal assessment tasks is allocated to support the theoretical content of the subject and develop project skills. Lab based activities generally take up less time than that of design project, require less specialist equipment and offer a more scientific route in the teaching of the subject. However, it should be noted that this option of assessment will no longer be available from April 2016, although such an approach could be used to develop skill through Teacher Directed Activities (TDA’s).

Teachers are to be reminded that candidate work should not be submitted where too much teacher guidance has been provided or the work is groupwork, as the work must be of that of an individual candidate. This continues to be less evident than in previous years, but still prevalent in Planning; Aspects 1 and 2 and Research; Aspect 1 where too much direction is provided. Candidates need to explore open ended problems for project work, and this continues to be the case for 2016 where candidates will also need to consider client and market opportunities. Themes set by the school are to be avoided where possible as this limits opportunities for independent research and generation of original ideas.

Teachers support materials, notes and project briefs should be included where appropriate in the sample of work submitted for assessment. Marks selected for moderation need to be highlighted on the 4/PSOWDT form for each assessment criterion. Schools need to check

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and tally marks on the 4PSOWDT and those entered on to IBIS for each candidate to ensure they are correct. Failure to do this can slow down the moderation of the work and cause significantly more work for the teacher, DP Coordinator and staff at IB Cardiff. Most samples were presented in an organized structure, but schools need to be reminded that work for each criterion needs to be flagged although there was less evidence of this being a problem than in previous years. All sections of the 4/PSOWDT are to be completed. Schools must use the official documentation for assessment available in the handbook of procedures. Please note, new forms and procedures are required for 2016.

Only one project will be assessed from 2016. This is project is more extensive than the current design project and adequate time will need to be given to address both SL and HL work. New criteria should enable further differentiation of marks and teachers are requested to use the full range of marks available where appropriate. Use of the exemplar material in the TSM to ensure standardisation of marking is recommended.

Candidate performance against each criterion

Planning (P)

The majority of candidates were able to achieve a minimum of at least a “Partial” for this criterion. When using the assessment criteria for a design project, candidates should consider the feasibility of the study, identify the user, analyse the situation, write a clear brief which identifies the intended goal and produce a detailed and justified specification. Where detail was missing students were often able to achieve a mark of “Partial”. Some work was very detailed and included photographic evidence of problems and market research. The quality of specifications is mixed; the best work makes use of research data, identifies quantitative constraints and includes detailed justification. Where initial specifications are considered, pupils need to follow this up with a more detailed version that considers the data collected. Such evidence is required will be required to achieve the higher level descriptors from May 2016, with the addition of marketing specifications.

Research (R)

Not all candidates had considered the need to plan data collection from a variety of sources or to include a list of apparatus or the method for an experiment that controlled variables. A detailed analysis of the problem is required if students are to score highly for Aspect 1. For a design project, students need to include reference to appropriate primary and secondary data sources. Priorities need to made clear and where questions are raised, these need to be addressed in the collection and analysis of data.

The best work in this section included a wide range of analysed data which included market research, product analysis, information regarding user needs and constraints for where items were to be used. Data that is unfocused to the task is not required and generally shows a weakness in the pupils’ understanding of the task. Cutting and pasting from websites is to be avoided. All work should be cited.

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Most students analysed data throughout the research phase, but the best work also included a summary of data at the end of each page or before finalising design specifications. Focused analysis of data is required from 2016.

Development (D)

There was evidence of some excellent work for this criterion, although some schools still fail to address the aspects within this criterion to an appropriate standard.

The best work included a wide range of creative and original concept ideas, often sketched in isometric or perspective with different views for extra detail. Presentation included a range of rendering techniques and detailed annotation. Modelling strategies aided the refinement of ideas, culminating in sufficient detail for the intended outcome to be realised. Most work included use of CAD to present orthographic drawings. The photocopying of ideas is to be avoided unless the quality of outcome is clearly legible.

Where ideas are mundane or offer limited variety pupils are likely to be awarded 'Partial'. In some schools this area needs further focus and attention to detail. Simply displaying an idea using a range of techniques or in different views is not enough to quantify awarding a 'Complete'. The chosen concept needs to be refined to consider functionality, user requirements, materials, construction, aesthetics, etc. Such work will require further focus from 2016 as more emphasis is given to the assessment of ideas, concept modelling, material and manufacturing choice. Two separate criteria are used to assess this area of the design cycle from 2016.

Evaluation (E)

With equal weighting being given to evaluation in the assessment criteria schools need to consider how much time is required to complete this aspect of the project to a high standard. Ideally candidates need to test their outcomes in the area designed for, or with the user for whom it had been designed. The best examples included detailed strategies for testing, including testing against specifications, user trials, expert feedback and performance tests. Evaluation of procedure should also be considered, and in most cases such work was superficial or missed completely. Testing is to be used so as to identify strengths and weaknesses in outcomes. Such weaknesses are to be used as a starting point to suggest recommendations.

Recommendations for the design project need to include a revised the specification, sketched modifications and consider the need for scaling up production.

In future candidates will also be required to consider the evaluation of marketing specifications, although SL candidates are only requested to consider recommendations to the one-off product. HL candidates will need to consider commercial production and marketing strategies.

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Manipulative Skills (MS)

In some cases thorough planning had taken place, but there is a need for some schools to be more detailed in their identification of materials and processes in order to plan time effectively. There was less evidence of planning, risk assessment and cutting lists this year than that of previous years. Photographic evidence of candidates using equipment at different stages of realization is encouraged. Health and Safety risks need to be considered and evidence of safe working should be obvious. Outcomes need to be of sufficient complexity for the level studied, but not overly complex as students need to ensure folio work is given adequate time to address each aspect. Suitable problems need to be considered from the outset as overly ambitious or simple outcomes can often limit manufacture and evaluation. Teacher guidance is needed.

Recommendations for the teaching of future candidates

Schools are reminded to flag work for moderation. The use of clear headings for each assessment criteria is recommended.

Use of the OCC exemplar material is to be encouraged by teachers in helping them understand and meet the standards of the new assessment criteria.

The subject guide for examinations starting in 2016 is now available. Teachers are encouraged to make use of the new OCC teacher support materials and where possible attend training.

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Higher level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 10	11 – 14	15 – 19	20 – 23	24 – 28	29 – 32	33 - 40

General comments

13 G2 comments were received – many thanks – they are extremely helpful in providing feedback to the examining team about the appropriateness of the paper. We appreciate, and try to take on board, any negative comments you offer and find any positive comments about anything you particularly found interesting/useful very helpful indeed.

All 13 G2s responded that the paper was appropriate. In comparison to the previous year's paper – one said it was a little easier, eight said it was of a similar standard, two said it was a little more difficult and two were new schools so did not comment.

In relation to the suitability of the question paper in terms of clarity of wording, two said it was poor, two said it was fair, six said it was good and three said it was very good. In terms of presentation five said it was good, seven said it was very good and one said it was excellent.

In terms of the suitability of the question paper in terms of accessibility and cultural/religious/ethnic bias four aspects were explored: learning support; religion/belief system; gender bias; ethnicity.

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
Learning support	0	0	1	4	8	0
Religion/belief system	0	0	0	1	11	1
Gender bias	0	0	0	1	11	1
Ethnicity	0	0	1	1	10	1

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In completing the analysis at the grade award we first look at any questions, which are negatively discriminating (see below) and those that generate strange response patterns from candidates and then at those questions that receive specific comments (these have been addressed below).

The Difficulty Index (rather counter-intuitively) is the percentage of candidates who selected the correct answer, so a difficult index of 100 would mean all candidates getting the question correct.

The Discrimination Index is an indication of whether the candidates you would expect to get the question correct and is used alongside the Difficulty Index. Any question that has a negative Discrimination Index is automatically looked at in the Grade Award meeting as this suggests the question has not worked as expected. For example, this may occur for a question with a relatively low Difficult Index (so few get it right), and where only the less able candidates get it right. This index ranges from -1 to +1.

For this paper we looked at questions 7 and 17, both of which had negative discrimination indices (0-.07 and -0.08, respectively). We decided that the wording of question 7 was potentially ambiguous and may have misled candidates and that the response for 17 was incorrectly entered. Question 7 was removed from the analysis and the correct answer was entered for Q17 and a computer remark undertaken.

One G2 commented: “The Higher Level paper contained questions from both core topics and AHL topics. Question paper displayed a combination of direct questions and case study (application based) questions. Pattern of the questions was clear and well communicating. Certain questions were little confusing, when it comes to choice of selection of answers”. The number of questions on each topic reflects the time allocation indicated in the Guide, there are fifteen common questions and this pattern will continue in the next session to reflect the time allocation for each topic in the new Guide.

Another G2 commented that: “Some questions are poorly worded and are too long and will cause difficulty in interpreting EXACTLY what the question is asking. Many students are EAL and it should be worded to accommodate by making it very succinct. A good example is Q23 as it is unnecessary to write ‘would be appropriate for the challenge maintaining continuity’”. This is a valid comment, which we take on board. We do try to make the questions as short as possible and the paper is read for its EAL accessibility. The question did not prove difficult for the candidates (difficulty index 70.78) and not negatively discriminating (discrimination index 0.25). The question was not removed from the analysis.

Q27, option iii: ‘Torque is zero’ is a little confusing as there is still a force but it is balanced with an equal and opposite turning force. So Torque is not zero but at the same time students would know that torque is a turning force so no turning = no Torque? We believe answer could be given as A and D? This is a very valid comment. It was not particularly difficult (difficulty index 36.53) and not negatively discriminating (discrimination index 0.35). The question was not removed from the analysis and D was used as the correct response.

Q31: “Big confusion with the clarity of the question. This one is a problem as it is stated that blow/injection and rotational can make these … not clear in guide but is very clear in research. It states the body is hollow and may be interpreted that the rest is solid? If you

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research the torso is most likely blow moulded and the hollow legs and head are rotational. If solid legs then injection moulded. We believe this question should be removed or at the very least except all answers except answer D compression which is clearly incorrect due to it being a thermoplastic. This was not a particular problem for the students. It was more difficult than some other questions (difficulty index 14.31) but not negatively discriminating (discrimination index 0.16). The question was not removed from the analysis.

Q33: "Shame that this question is in the paper given that there are so many questions that teachers are guided to teach. Questions like these and Q35 are NOT in the syllabus/DT Guide". Both questions were fairly easy and neither was negatively discriminating. The examiners do not agree that the questions are not valid and, whilst not as direct as some of the other questions, seem fair. The candidates did not seem to have a problem with either: for question 33 the difficulty index was 69.18 and the difficulty index 0.37; for question 35 the difficulty index was 66.10 and the discrimination index 0.43. Neither question 33 nor 35 was removed from the analysis.

"Phraseology in questions was less open to interpretation this year so I feel could be better understood by students". This comment is reassuring, many thanks.

"The wording of the questions are [sic] confusing by the frequent use of negatives with positives, e.g. which of these is NOT an example of … What is confusing is that some of the responses which is confusing is in fact true/false. Students would be fooled into thinking there is only one answer and therefore not regard the 'NOT' statement and select a for one answer that they think is true, whilst ignoring the other true statements because they aren't obvious". There is no evidence that this was a problem for candidates in this session but we will bear it in mind in developing papers for future sessions. Thanks for the comment.

The strengths and weaknesses of the candidates in the treatment of individual questions

Q35:

"Why use the term summer solstice? Foreign students here have not learnt this vocabulary nor do they ever really need to. This throws them yet it is not relevant to the DT knowledge but is simply the context chosen. Croatia, Zagreb – again no need to say this. Students here will be lost by this". This is a very valid comment but fortunately this was not a problem for students and 579/876 got it right. It was not very difficult but discriminated relatively well between stronger and weaker students (discrimination index 0.43) probably because it involved mathematics. The question was not removed from the analysis.

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Standard level paper one

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 7	8 – 11	12 – 16	17 – 18	19 – 20	21 – 22	23 - 30

General comments

For this paper nine G2s were received. Again many thanks. As for the HL paper these comments are extremely helpful in providing feedback to the examining team about the appropriateness of the paper. We appreciate, and try to take on board, any negative comments you offer and find any positive comments about anything you particularly found interesting/useful very helpful indeed.

8 of the G2s responded that the level of difficulty of the paper was appropriate. One said it as too difficult. In comparison to the previous year's paper - two said it was a little easier, four said it was of a similar standard, two said it was a little more difficult and again two were new schools and did not comment.

In relation to the suitability of the question paper in terms of clarity of wording, four said it was poor, none said it was fair, four said it was good and one said it was very good. In terms of presentation two said it was fair, two said it was good and five said it was very good.

In terms of the suitability of the question paper in terms of accessibility and cultural/religious/ethnic bias four aspects were explored: learning support; religion/belief system; gender bias; ethnicity.

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
Learning support	0	1	2	3	3	0
Religion/belief system	0	0	1	0	8	0
Gender bias	0	0	1	1	7	0
Ethnicity	0	0	2	1	5	1

One G2 said that: "The paper contained questions from most of the core topics. Questions showcased the level of standard too. Paper displayed a combination of direct questions and case study (application based) questions. Certain questions were little confusing, when it comes to choice of selection of answers". The paper is designed to have questions from all

the core topics – the number of questions on each topic relates to the time allocated to each topic in the Guide.

Another G2 comment related to EAL candidates: Q24 and 29: “The use of negative questions is not good for EAL candidates”. Sometimes it is difficult to frame a question in the positive and the use of the negative is helpful. We do limit the total number of these on a paper.

The Difficulty Index (rather counter-intuitively) is the percentage of candidates who selected the correct answer, so a difficult index of 100 would mean all candidates getting the question correct.

The Discrimination Index is an indication of whether the candidates you would expect to get the question correct and is used alongside the Difficulty Index. Any question that has a negative Discrimination Index is automatically looked at in the Grade Award meeting as this suggests the question has not worked as expected. For example, this may occur for a question with a relatively low Difficult Index (so few get it right), and where only the less able candidates get it right. This index ranges from -1 to +1.

The strengths and weaknesses of the candidates in the treatment of individual questions

Q9: “Regarding the obstacles to recycling PET not explicitly references [sic] in the specification/teacher notes”. The examining team would argue that this is application of knowledge – PET is a thermoplastic and a feature of thermoplastics is their ease of recyclability. This was not a problem for candidates - 713/853 got it right - fairly easy (difficulty index 83.59), and reasonably discriminating (discrimination index 0.31).

Q13: “What is the basis of the IB categorization of materials – is this DT knowledge or remembering a category? Why is this being tested?” This was not a problem for candidates - 653/853 got it right - fairly easy (difficulty index 76.55), and reasonably discriminating (discrimination index 0.39).

Q23: “There is more than one right answer”. The examining team does not agree with this comment. This was not a problem for candidates - 372/853 got it right – slightly more difficult (difficulty index 43.61), but reasonably discriminating (discrimination index 0.41).

Q24: “Morphological synthesis – not even the Guide can provide a clear definition”. We are not sure where this comment comes from – it does not relate to Q24.

Case study photograph: “the lamp in the assembled form is a blur”. Yes it is slightly blurred but it is clear enough and is helped by the inclusion of addition information in the stem. This was not a problem for candidates who on the whole did well across the case study questions.

Q26: “The use of the word ‘most’ in the question is confusing’. This was not a problem for candidates - 303/853 got it right – slightly more difficult (difficulty index 35.52), but some discrimination (discrimination index 0.20).

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Higher level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 5	6 – 11	12 – 16	17 – 23	24 – 30	31 – 37	38 - 60

General comments

In general the paper seemed to be well received and candidates felt able to attempt the questions. Question nine was the most attempted question in Section B followed by question seven and then question eight. The marking showed no disparity between the three questions in terms of difficulty. Most candidates coped reasonably well with the data - based question in Section A and there was the usual level of mixed responses to the short answer questions in Section A.

The Grade Award Team always takes into account comments from teachers received via the G2 feedback forms especially if a trend can be identified in the nature of the responses to particular questions and the overall difficulty of the paper. Grade boundaries are then set accordingly in order to be fair to candidates without compromising academic rigour in the process.

The areas of the programme and examination which appeared difficult for the candidates

Question one, the data-based question, was problematic for some candidates who did not assimilate the various pieces of data holistically thus gaining an understanding of the design context and how the product would perform under different conditions. More able candidates are expected to be able to apply appropriate parts of the data to the nature of the questions. This will require considerable thought to understand the implications of questions which ask for an explanation/discussion. As the data is often quite accessible to candidates there is a tendency for them to write down their first thoughts without checking back on the data and thinking more carefully about the underlying meaning of the question. Consequently, many candidates who are clearly quite able fail to gain high marks on Question 1 as they only provide relatively superficial responses to the three mark questions.

Unsurprisingly, given the statement above, a similar situation prevailed with Section B questions, especially for answers to part c ii. Very few candidates gained more than 60% of the marks available for c ii questions due to lack of depth and making generalised comments in their responses.

There was a general lack of understanding of a few of the syllabus topics resulting in poor marks for the examination questions relating to these topics i.e. clean coal technology; forces and equilibrium; vacuum forming; LVL material and timber as a natural composite.

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The areas of the programme and examination in which candidates appeared well prepared

The vast majority of candidates wrote a significant amount during the examination (too much in some instances resulting in repetitive answers and vague responses) indicating that they felt able to answer the questions and had much to say. The overall impression is that most candidates felt comfortable with the structure of the paper and the time allocation.

The strengths and weaknesses of the candidates in the treatment of individual questions

Section A

1a(i) Most candidates gained the available mark.

1a(ii) Varied responses - some candidates either stated incorrect data or were not precise enough e.g. 84 Wh.

1a(iii) Many candidates gained one mark by referring to use of a table or carrying height but did not develop the answer by reference to a test which replicates the most likely height at which it would be accidently dropped.

1b(i) Most candidates identified that consumers would have redress if the product was faulty though some incorrectly stated that this would be the case if the product became damaged in use and few candidates gained the second mark relating to increased consumer confidence.

1b(ii) Although many candidates correctly referred to the thermal overload protection they did not gain the additional mark by briefly explaining what this meant i.e. the unit would shut down if activated.

1c(i) Most candidates correctly identified the cost issue.

1c(ii) the majority of candidates failed to fully understand the meaning of "appropriate technology" and just focused on environmental issues rather than the data supplied which mentioned the use of local partners and the opportunity for charging electronic devices where no national grid was available.

1d(i) This question illustrated the problem of candidates not giving enough consideration to the data supplied i.e. the hail test was a lab-based and so a performance test not a field trial.

1d(ii) Most candidates appreciated some of the limitations of the test but care needed to be taken to differentiate the points made in order to gain all three marks.

1e(i) Few candidates looked back at the data supplied to identify which aspect to use in the answer to this question.

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1e(ii) Many candidates misunderstood the meaning of "flexibility" in this context and referred to adaptability to different contexts rather than the portability of the product in use.

2a Some candidates failed to gain the mark as their response was too vague e.g. "availability"

2b Although most candidates seemed to know something about clean coal technology many did not read the question carefully enough to provide a discussion of three clear points referring to what extent clean coal technology impacted on the use of coal as a fuel source in terms of the environment.

3a Many candidates confused the structure of LVL timber with that of plywood.

3b Most candidates gained a mark for reference to aesthetics but did not develop the answer in relation to matching other timber products/structures or increased choice.

4a This was an easy question for candidates who understood the nature of the load but surprisingly few candidates managed this.

4b Most candidates managed to gain a mark by reference to balance of forces but not many applied the definition of equilibrium in precise enough detail to explain also that they were equal in size and opposite in direction.

5a Many candidates incorrectly referred to the size of timber that was being abraded rather than the common issue of users pressing too heavily on the belt to try and quicken the process.

5b Most candidates correctly identified that the belt would need replacing when worn but not many referred also to the simplicity of the machine so not much maintenance required.

6a The markscheme is fairly generous in allowing answers referring to minimizing water waste and recycling waste water so most candidates were able to gain the mark rather than referring to a living building harvesting its own water needs on site which would be more precise.

6b Although many candidates understood the difference between grey and black water not many gained full marks by picking up on the point of the question in relation to the symbolic use of these colours.

Section B

Question 7.

7a(i) This was a simple "recall" question but it was not answered well by the majority of candidates.

7a(ii) This proved to be a relatively easy question for most candidates

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7b(i) Many candidates correctly identified "design for materials" as the category but failed to gain both available marks by justifying the choice.

7b(ii) This question proved very tricky for many candidates. Having correctly stated that the gloss finish would repel moisture very few candidates appreciated that wear and tear would be an issue with this type of product and that the gloss finish was likely to deteriorate over time and be difficult to replace.

7c(i) Most candidates could relate their answer to regrowth/replenishment of bamboo but only few candidates developed their answer to include speed of growth.

7c(ii) Many candidates appeared to give "off-the-cuff" answers which referred to general markets for keyboards rather than specific markets for this type of quirky product. The "eco" market did feature in many responses which allowed for a few marks to be gained.

Question 8.

8a(i) Most candidates did not focus on the part of the question 'contributes to the manufacture of the chair' and just provided a definition of "plastic deformation".

8a(ii) Similarly, the majority of candidates demonstrated understanding of the concept of "elastic deformation" but did not relate it to comfort for two marks.

8b(i) Although the markscheme offers a choice of three reasons nearly all candidates focused on the uniqueness of the design when first produced but did not relate this to high R&D/design costs.

8b(ii) Most candidates gained an easy mark for referring to a smooth surface but in discussing comfort hardly any candidates appreciated that the surface is very hard and so not very comfortable for long periods or that it would be slippery.

8c(i) Most candidates failed to identify vacuum forming as the technique.

8c(ii) This type of question has appeared in many past papers so many candidates were familiar with the concept of "form v function" but ran into difficulty in planning their answer to focus on three distinct points which related to aspects of form AND function rather than just listing a variety of points referring to either form or function. Clearly, this concept was a major challenge to the designer of the chair and hence, the reason for the question.

Question 9.

9a(i) Many candidates thought that the size of the device would inhibit it's suitability for observing wildlife rather than noise/vibration or the limited depth it could be used at.

9a(ii) This proved to be a relatively straightforward question for nearly all candidates.

9b(i) Few candidates focused on the use of the lithium batteries and the problem of these at disposal.

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9b(ii) Few candidates thought carefully about the use of the product in seawater and the problem this would cause for maintenance especially with mechanical parts.

9c(i) Hardly any candidates thought about the problem of re-charging the battery after such a short period of time when using it on the beach or the suitability of the product for different members of a family in relation to capability and safety.

9c(ii) Most candidates gained marks for reference to safety issues if the battery ran out while under water or inexperienced users strayed too far and were out of their depth but many candidates also thought that the rotating blades were a major safety issue despite the guard and that users would have to make a deliberate attempt to poke fingers through the guard for this to be a problem.

Recommendations and guidance for the teaching of future candidates

Candidates would be well advised to read all the questions very carefully before attempting to answer them, particularly question stems which contain a large amount of information such as Question 1 in Section A and the Section B questions. Candidates should be encouraged to look for key words in these questions and relate the command terms used to structure appropriate responses. For nine mark questions in Section B, often the markscheme "clusters" the answers with three marks for each cluster. In the examination, candidates should try and anticipate what these clusters would be and how to differentiate between them to avoid repetition and vague answers. Each cluster is made up of three distinct points.

For the data based question (Question 1) candidates should appreciate that the two sets of data are linked and that the second piece of data examines the context in more depth. When answering the questions candidates should be looking to refer to appropriate aspects of the data and avoid generalisations.

A good understanding of the meaning of each of the command terms is essential to provide suitable responses - it was clear from this year's marking that many candidates knew the topic being examined but failed to provide answers which contained enough development to gain all the available marks.

Although this paper is the last May Higher Level Paper Two for the current Subject Guide the May 2016 Paper Two (a common paper for both Higher and Standard Level) will follow a similar format.

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Standard level paper two

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 4	5 – 8	9 – 14	15 – 18	19 – 21	22 – 25	26 - 40

General comments

Most candidates were well prepared for the exam and overall the quality of responses from candidates was good in comparison to previous years. In general candidates showed good analytical qualities, and understood the context of most questions. Some lack of experience or practice was evident in some cases and at times further specific knowledge to answer certain questions was needed. Most candidates had some idea of what they were writing about. In a few cases candidates seemed not to know how to select the required content to answer questions from their knowledge base. Perhaps candidates need to be provided with more practice to answer questions that require analysis and explanations, so as to improve their critical thinking skills. The tendency to be superficial in responses was also noted in the types of errors that candidates made. It was clear that many had an idea of the area but lacked the specific knowledge to provide complete or correct responses. The suggestion here is teachers should engage students in developing deep and enduring understanding of concepts by using strategies that help students to connect ideas and understand principles. Classroom conversations about design concepts and contexts should be encouraged and the correct use of terms during classroom conversations should be the norm.

The areas of the programme and examination which appeared difficult for the candidates

Many candidates found Section B more challenging than Section A, particularly with the 9-mark question. Some students also found certain questions difficult to interpret in relation to the context of Question 1 in Section A.

Question 5 of Section B was particularly challenging, especially the 9-mark question concerning robust design - although this was the least commonly attempted Section B question. Most students understood the concepts of fashion and planned obsolescence although some failed to relate this adequately to the product.

The treatment of the long answer part in Section B overall seemed to improve on last year, although there is still scope to improve the planning and presentation of the response using key words here. This is especially important for students who are writing in their second language.

Some students found specific concepts difficult. Many candidates failed when trying to identify a specific concept in several similar questions throughout the exam. For example:

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Q 1c(i) asks about a specific definition, but many students failed to identify adaptation as the idea generating technique behind the hydroelectric scheme.

Q 2(b) many students found confusing. Again, a specific concept like planned obsolescence is not clear in most cases, as students didn't find a difference in durability between leather and fasteners/stitches/rivets; whilst fashion obsolescence was poorly explained in many cases.

Q 4c(ii), Q 5c(ii) Q 6a(i), Q 6b(i) were not answered well when asked about specific concepts. Many answers showed little understanding of these.

The areas of the programme and examination in which candidates appeared well prepared

The candidates seemed well-prepared overall. Most candidates made good efforts to attempt the required number of questions and appeared to have ample time to complete the paper. Many candidates showed the ability to read and understand questions adequately, particularly for Section B - Questions 4 and 6. They demonstrated a good understanding of facts and concepts and were able to provide good responses to many questions.

Question 4 and 6 were the most accessible questions in Section B and provided the best opportunities for students to attain the highest marks.

The candidate's understanding of ideas generating techniques was generally good. Most students were able to answer the 9-mark question for Question 6 well due to a good understanding of evaluation techniques.

The strengths and weaknesses of the candidates in the treatment of individual questions

Section A

Q1a(i) This question was answered well overall – candidates applied different methods to reach the correct answer.

Q1a (ii) This question was not answered well overall. Candidates found this question confusing as they thought of the screw mechanism but not the strong current. A photo of the fish run may have helped.

Q1a (iii) Many candidates managed to achieve one mark for this question, however the most common answer was water current. Many students listed water flow/currents/matter state (frozen water) instead of river water level. Q 1a(iii) and Q 1b(i) seemed confusing for many students. In several cases they had the right answer but for the wrong question. Although each question asks for different responses, reasons for the scheme to have variations in the energy output and variations in the spin rate could be quite similar. The fact that these

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questions were in sequential order may have enticed some students in this situation to think of something quite different for the second question.

Q1b (i) Many candidates managed to achieve one mark for this question, however the most common answer was water level. This question caused confusion with Q1a (iii). Many candidates managed to earn one mark; many also repeated their Q1 (a) (iii) answer due to the two questions being quite similar.

Q1b (ii) Most candidates managed to achieve one mark for this question by referring to the increase power need. Very few managed to earn the second mark.

Q1c (i) This was a straightforward question for most of the candidates. Many earned the mark, but a few mixed up the techniques and answered analogy or brainstorming.

Q1c (ii) Candidates who thought carefully about the “400 homes” as an estimate, managed to achieve one or two marks. Very few managed to earn the third mark however. Many students gained two out of three marks but the last part of the answer in the mark scheme was very difficult to achieve.

Q2a Many candidates did not know the manufacturing technique for the bag. More candidates answered stitching instead of fasteners and accordingly lost the mark. A clearer photo may have helped.

Q2b A very difficult question which many candidates did not interpret well. An extremely small number of candidates were able to achieve full marks with the majority achieving only one mark or zero marks. A very limited number of candidates mentioned retro design or nostalgia, whilst many were confused or misled by specifically focusing on the relationship between planned obsolescence and fashion.

Q3a Many candidates answered this question correctly. Although almost as many candidates answered 50% as they did 5%.

Q3b Many candidates did not read this question carefully. A very small number of candidates achieved full marks and a significant number achieved only one mark. Few managed to earn the second or third mark. Many candidates used the example of differing race/gender/ethnicity to answer this question and also considered variations in different global regions. Very few candidates achieved the full three marks and missed the final point of using a medium/mode/context.

Section B

Question 4.

This question was the most popular choice. The majority of candidates felt comfortable as they attempted to answer this question.

Q4a(i) The most common answers were for transportation and fit it in the backpack.

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Q4a(ii) Almost all candidates were able to provide the correct answers and achieve at least one mark. A significant number of candidates achieved two marks.

Q4a(iii) The most common answers were for convenience, flexibility and ease of use. Almost all candidates were able to provide the correct answer and achieve at least one mark. A few candidates managed to earn two marks.

Q4b(i) Causing chemical pollution was popular answer by many candidates, however many did not mention the safety aspect of the product.

Q4b(ii) The majority of candidates focused only on one area of ease-of-maintenance and therefore only a small number successfully managed to achieve the full three marks. A few candidates managed to earn a second or third mark. A very limited number of candidates considered the production of ash.

Q4c(i) A good number of candidates justified only one safety aspect of the Biolite stove and achieved one mark for this question while a few managed to achieve two marks. The majority of candidates linked spilling water with electric shock/injury (electrocution) and accordingly lost the mark.

Q4c(ii) A significant number of students were able to achieve 3 or more marks for this question. The most common answers were ease of use and testing on an expedition/outdoors. Many students displayed a fair understanding of evaluation strategies also. There was some confusion in the parameters measured by the different trials but overall this question broken into 3 distinct components gave students reasonable scope to achieve three or more marks.

Question 5

This question was the least commonly selected question chosen by candidates.

Q5a(i) This was a fairly straightforward question but a number of responses were out of context.

Q5a(ii) This was another straightforward question but a number of responses linked colour to other interior design aspects. Very few candidates earned marks for this question.

Q5a(iii) Candidates who demonstrated a good understanding of the question achieved at least one mark with a few able to achieve two.

Q5b(i) The majority of candidates achieved one mark for this question by selecting one of the three options available

Q5b(ii) The majority of candidates suggested the one correct point without further elaboration. Few managed to earn the second or third mark.

Q5c(i) Candidates who demonstrated a good understanding of the question achieved at least one mark and many were able to achieve full mark.

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Q5c(ii) The question was very challenging for both weak and strong candidates. Generally candidates failed to link robust design properties with the Bagalight product. This was clearly the most difficult of the 9 mark questions.

Question 6

This was also a popular choice amongst candidates; after Question 4, it was the next most commonly chosen Section B question.

Q6a(i) This was a straightforward question but still a number of incorrect answers were provided – in particular, performance test.

Q6a(ii) Many candidates managed to achieve one mark for this question, and a few candidates attained the full mark. Only a few candidates mentioned fatigue.

Q6a(iii) There were very few precise answers for this question. Most candidates were unable to define it with the required accuracy for a scientific definition. Even though this was a fairly straightforward question, only a few candidates managed to earn full marks, although most got at least one. There were slight variations in how the second part of the definition was answered.

Q6b(i) This was a fairly straightforward question and many candidates answered this question correctly.

Q6b(ii) Candidates who answered superficially achieved one mark while the other candidates managed to achieve higher marks. Only a few managed to earn the second or third marks.

Q6c(i) Most candidates managed to achieve one mark for this question by referring to development of the Water Craft in an existing market. Only a few managed to earn the second mark.

Q6c(ii) The question was challenging for weaker candidates. Some candidates were confused as they considered Kemp Ross to be an entrepreneur. A good number of candidates were able to achieve 3 or more marks. Several candidates tried to put Kemp in all three positions, as though he went from inventor to innovator, and then to entrepreneur, which was not the case. In their answers candidates seemed to understand the differences between each stage/role, but trying to make them work with the case study was challenging.

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Recommendations and guidance for the teaching of future candidates

Any candidate whose handwriting is poor should be reminded that if the examiner cannot read the response they will not get any marks.

Students should be reminded that it is pointless to write out the question again as part of the response.

Teachers and candidates must be familiar with all command terms.

For three mark questions, candidates must make sure there are three significant and distinct points that allow them to achieve the highest number of marks.

Teachers must emphasize the importance of planning the long answer part in section B questions. Writing long connected prose is not necessary and the use of sub-headings for the three parts to split them up into obvious sections is encouraged where necessary or appropriate.

Some candidates answered all parts of Section B, but please remind students that they should only answer one.

In May 2016 there will be the first set of examinations of the new syllabus. Teachers should:

Focus on ‘Nature of Design’ and case studies when teaching.

When teaching, explain the concepts and connect them to actual examples. Then, ask them to do the same on their own.

Most questions could be answered using common sense. Students could refine their common sense by reading more about the motivations, process and results an individual or company went through to introduce and sustain a product in the marketplace.

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Higher level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 3	4 – 6	7 – 10	11 – 17	18 – 24	25 – 31	32 - 40

General comments

Options C & E remain the most popular and form the bulk of the entry. Option A has a significant number of candidates, whilst Options B & D are attempted by very few centres.

A continuing problem is that candidates fail to respond to the stem of the question e.g. 'Describe one way', or the focus is missed e.g. 'manufacturers' rather than 'consumers'.

There was a further deterioration in the quality of handwriting. Some responses have almost been impossible to decipher. Candidates should be advised to take their time when writing their responses in order to make them legible.

There is an increasing tendency to write outside of the designated area and this can lead to creditable parts of a response being missed. If necessary, an additional answer book should be used.

A further point with respect to this is the choice of writing implement. Candidates are strongly advised not to use felt-tip pens or anything that does not produce a clear and clean impression and does not 'bleed through' the paper.

The areas of the programme and examination which appeared difficult for the candidates

As reported in the past, too many candidates appear to approach the subject from a 'general knowledge' viewpoint and lack the technical knowledge required to access the higher mark ranges.

It sometimes appeared that candidates had only acquired the knowledge contained in past papers as the examples used to illustrate answers were often taken from them.

Many candidates find it difficult to structure their responses to the longer questions, where repetition is the main enemy.

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The areas of the programme and examination in which candidates appeared well prepared

There was a continued increase in the use of prose when answering questions, rather than single words or bullet points, which limit access to the higher marks.

There was a continued reduction in the number of 'No Responses', with candidates at least making an 'educated guess' based on general knowledge.

The strengths and weaknesses of the candidates in the treatment of individual questions

Option A

1(a) Most candidates were able to give a reason.

1(b) Many candidates just described gluten intolerance rather than outlining the impact on diet.

1(c) Some candidates answered this from the viewpoint of the consumer rather than the retailer.

2(a) Not well known - a significant number of candidates effectively repeated the question: 'a genetically modified organism is an organism that has been genetically modified'.

2(b) Most candidates did not respond to the word 'significance' and just described the tomato.

3(a) Generally well answered.

3(b) Often answered as 'packaging' rather than 'labelling'.

4 The technical knowledge required for this question was not exhibited by the majority of candidates.

5(a) Well answered.

5(b) Once again, a 'technical phrase' that was not well understood.

5(c) Most candidates were able to outline the manufacturer's role.

6(a) Answers mainly concentrated on hygiene, limiting the marks available.

6(b) Candidates were unable to focus on the 'design' of the convenience foods, rather than discussing their uses.

7 The majority of candidates were able to access this question, but suffered from repeating aspects of their answer.

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Option B

This option is taken by very few centres and the candidates mainly perform at a high level.

Some candidates found it difficult to clearly explain how the circuit worked in 8(c) and repetition in the longer questions limited some candidate's marks.

Option C

15(a) Correctly stated by very few candidates.

15(b) Many candidates outlined the change the wrong way round.

15(c) Generally well answered.

16(a) Most candidates gained this mark but some were clearly confused by a previous question about lost wax casting.

16(b) Well answered, although the word 'cheap' was often used without an explanation.

17(a) Correctly answered by the vast majority of candidates.

17(b) Candidates sometimes answered from the aspect of 'repeat' tests, rather than a 'series' of tests.

18 Accessed by most candidates, but often with repeat reference to speed.

19(a) Reasonably well answered, but robots confused with CNC machines.

19(b) Poorly answered by most candidates as they could not relate it to accuracy' when turning spindles.

20(a) Attempted by most candidates but many could not structure a coherent answer, attempting to describe the process rather than explaining the reduction of natural resources.

20(b) Well attempted by the majority of candidates but with repetition.

21 Many candidates limited the number of marks achieved by solely concentrating on 'way out' TV adverts. Others talked about the 'development' of the vehicle, which gained no marks as the question referred to the 'promotion' of new vehicles.

Option D

22(a) Not well answered as many candidates gave non-technical answers.

22(b) Candidates concentrated on fashion issues.

22(c) The properties of nylon were not understood in terms of its disadvantages in the situation.

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23(a) Italy was rarely given as an answer.

23(b) The limitations were virtually unknown by candidates.

24(a) Dimensional stability was rarely offered as a reason.

24(b) Candidates were able to propose a sensible reason based on the question in most cases.

25 Although most candidates appeared to have some understanding of the question, few were able to structure a coherent answer that made a comparison based on 'value-for-money'. They concentrated on explaining the differences between the processes.

26(a) Although the technology of haptic devices was clearly not well known, candidates were able to explain how they may help the gymnast.

26(b) The process of laser welding was not well understood.

26(c) The disadvantages were not understood, with 'takes too much power' being the most common response.

27(a) Most candidates were able to access this question, but some misinterpreted the stem as 'industrialisation'.

27(b) Although the stem of the question clearly stated 'rather than just the textile employees', this was ignored by a significant number of candidates.

28 Most candidates were able to formulate a reasonable response to this question, with some producing a well-argued discussion often based on the development of the fashion industry.

Option E

29(a) Not well known.

29(b) & (c) There was a general lack of understanding of the terms qualitative and quantitative which hindered candidates from responding well to these questions.

30(a) Some candidates thought the question referred to feedback in terms of 'testing'.

30(b) 'Affordance' was regularly answered in terms of the 'cost' of the product and the ability of a customer to buy it.

31(a) Generally well understood.

31(b) Too many candidates did not respond to 'width' and continued discussing 'height'. Many others based their answers on boards with 'adjustable widths' rather than different board widths.

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32 This question enabled most candidates to gain some marks. However, too many did not focus on 'human factors' and deviated onto material and functional aspects.

33(a) Whilst most candidates were able to state that 'smell' was the main sense involved, many could not state that it was 'physio-pleasure'.

33(b) Many candidates failed to gain the full 2 marks, as they mixed up the two definitions in their responses.

33(c) The question was largely not understood, leading to repetitive answers based on 'looking after the environment'.

34(a) A significant number of candidates discussed 'slow motion' and 'time lapse' photography rather than motion capture.

34(b) The need for obtaining 'the complete picture' was not discussed in the responses to this question. The majority referred to 'errors' made when carrying out the process.

35 Although the word 'constraints' was misinterpreted as 'specifications' by many candidates, a well presented response was still credited. However, many candidates did not address how this would 'compromise' the 'user interface' for 'new' products, concentrating more on what could be wrong with them.

Recommendations and guidance for the teaching of future candidates

An increasing number of candidates do not appear to possess the necessary technical vocabulary to access the full mark range, often using generic descriptions of materials and inaccurate descriptions of the significant processes in each option.

Candidates should be advised once again not to repeat the complete stem of the question in their answer. Not only does this waste time and space in the examination but can give the false impression that they have answered part of the question by doing so.

Candidates should be urged to take more time over reading the stem and the key requirements contained within the body of the question. Too often marks are lost by, for instance, only giving one example rather than the required two. Repeating an aspect in a different form cannot be credited twice.

Candidates are also advised to concentrate on the preparation for the 6 and 9 mark questions. These are effectively made up of 2 x 3 marks and 3 x 3 marks. Repetition is a common problem here, as is lack of depth of response, often due to lack of technical knowledge and vocabulary.

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Standard level paper three

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 – 2	3 – 5	6 – 9	10 – 14	15 – 18	19 – 23	24 - 30

General comments

One G2 commented that: “Paper three questions were really appropriate w.r.t. the options selected. Most of the questions were clear and specific to the context displayed. Good paper”. Thanks.

Overall candidates performed reasonably. Stronger candidates do tend to provide more clearly structured answers, which is particularly important for the 9-mark questions. As one G2 commented: “The academic English students really struggled with the longer questions and how the language was set up to write the questions. Long complex wording”. This is not a new phenomenon and for some (weaker) candidates the 9-mark responses seem like a stream of consciousness with lots of repetition and irrelevant material. This is something that teachers can prepare candidates for in class-based revision sessions.

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As reported in the past, too many candidates appear to approach the subject from a 'general knowledge' viewpoint and lack the technical knowledge required to access the higher mark ranges.

It sometimes appeared that candidates had only acquired the knowledge contained in past papers as the examples used to illustrate answers were often taken from them.

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The strengths and weaknesses of the candidates in the treatment of individual questions

Option A:

This is a less popular option although not the least popular option (which is option B closely followed by option D). The food science/technology knowledge of candidates continues to be weak to the point that in some schools it is not obvious that candidates have been taught the option at all. None of the questions posed particular problems. In question 3 it was not obvious that students understood the difference between food packaging and food labelling or in question 4 the role of primary processing. Question 5 on chemical spoilage of food was very poorly answered. Question 6 on the impact of low intakes of protein, carbohydrates and water-soluble vitamins was similarly poorly answered. Many candidates offered clearly incorrect answers discussing minerals and fat-soluble vitamins (A, D, E and K).

Option B:

A very small number of candidates answered this option at SL, too small to get a feel for any problems but apart from the 9-mark issue there were no obvious problems.

Option C:

One G2 commented: “The first question regarding the type of lathe machine tool was an extremely difficult question. Without access to that type of machinery in schools it is very difficult to have that type of knowledge. Understanding how the tool shape has an effect on the billet being machined is one thing but naming a specific tool shape is another Also without a proper text book this information become very difficult to know”. The wisdom of a school picking option C it does not have access to CAD/CAM equipment is highly debatable. Schools should be picking an option that enables them to provide suitable practical exercises. However, the examining team does have some sympathy with the comment about the name of the tool shape and will take this on board for the future.

Questions 17 and 18 were very poorly answered by candidates although even in retrospect it is not obvious why this should have been apart from the fact that a more structured answer is required to achieve the 6 and 9 marks on offer.

Option D:

Not a very popular option but none of the questions posed any particular problems.

Option E:

The most popular option by a long way and posed no particular problems for candidates apart from the issue relating to the requirement for more structured responses to earn 6 or 9 marks in the later questions.

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